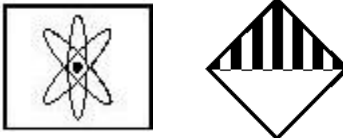


Final Hazard Profile – Hazardous Materials

Hazardous Materials

 Hazardous Materials	Frequency	50+ yrs	10-50 yrs	1-10 yrs	Annually
	People	<1,000	1,000-10,000	10,000-50,000	50,000+
	Economy	1% GDP	1-2% GDP	2-3% GDP	3%+ GDP
	Environment	<10%	10-15%	15%-20%	20%+
	Property	<\$100M	\$100M-\$500M	\$500M-\$1B	\$1B+
	Hazard scale	< Low to High >			

Risk Level

- Frequency – Hazardous Material releases happen in Washington on an annual basis.
- People – Though Hazardous Material releases can adversely affect or kill people, the likelihood that a Hazardous Material release would kill more than 1,000 people to meet the minimum threshold for this category is highly unlikely.
- Economy – Recovery from a Hazardous Material release is not likely to cost 1% of the States Gross Domestic Product (GDP) to meet this category's minimum threshold.
- Environment – While the environment and species that inhabit the areas in and around a Hazardous Material release can be adversely affected in an event, the likelihood that 10% of a single species or habitat will be lost due to a Hazardous Material release is highly unlikely.
- Property – Recovery from a Hazardous Material release is not likely to cost over \$100M to meet this category's minimum threshold.

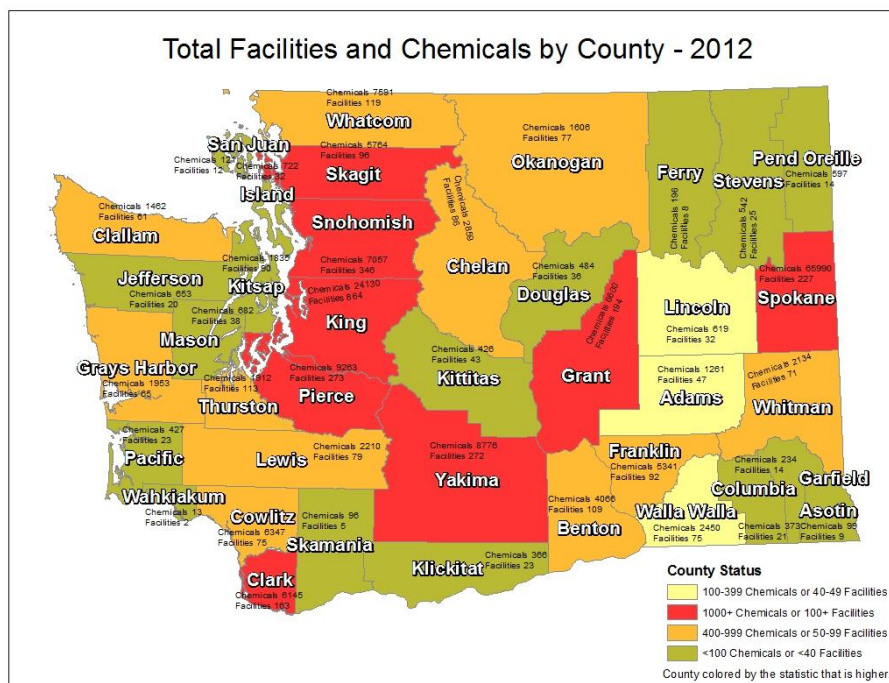


Figure 5.13-0-1 County HazMat Facilities and Chemicals

Final Hazard Profile – Hazardous Materials

Summary

- The Hazard – Hazardous materials incidents include the unwanted, unplanned, or deliberate release or escape of explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, or radioactive substances that may cause or create a potential risk to public health, safety, or the environment.
- Previous Occurrences – Washington has a varied history of hazardous materials incidents and while some appear to be on the downward trend (such as drug lab incidents) others remain fairly constant, but vary by location and amount (oil and chemical spills or releases, etc.).
- Probability of Future Events – Determining the probability of future hazardous materials incidents is difficult because so many factors can contribute and there are so many different types of incidents.
- Jurisdictions at Greatest Risk – Hazardous materials incidents have impacted every county in the state and are dependent upon a variety of conditions. Western Washington counties are most at risk due to dense industrial and populated areas and major transportation routes surrounding the fragile ecosystems of the Puget Sound and coastal waterways. Some Eastern counties are increasingly at risk with growth in population, industry, and transportation. For the purpose of this profile, analysis will not be conducted to determine the jurisdiction of greatest risk.
- Special Note – This profile will not attempt to estimate potential losses to state facilities due to hazardous materials incidents.

The following hazardous materials categories are considered for this profile:

- Spills either at fixed facilities or on transportation routes which include water, land and pipeline
- Methamphetamine Labs
- Radioactive Materials
- Fukushima Tsunami and Nuclear Reactor
- Hanford Nuclear Reservation
- Columbia Generation Station
- Washington Cleanup Sites for Leaking Underground Storage Tanks, Brownfields and Superfund

Final Hazard Profile – Hazardous Materials

The Hazard^{1, 2, 3, 4, 5}

Hazardous materials are defined as such because of their chemical, physical, or biological nature which can pose a potential risk to human health, property, or the environment when released. A release may occur by spilling, leaking, emitting toxic vapors or any other process that enables the material to escape its container, enter the environment, and create a potential hazard. Potential sources of hazardous material releases include, but are not limited to: superfund sites, storage facilities, residences, manufacturers, transportation carriers, hospitals/medical facilities, veterinary hospitals/clinics and Brownfield sites. The hazard can be explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, or radioactive, and can exhibit qualities of a biological agent. There are also naturally occurring hazardous materials releases. These naturally occurring hazardous material releases may produce the same potential risk to human health as the manufactured chemicals or agents.

In addition to the standard definition of hazardous materials, there are other agents which also fall into this category. Etiologic agents are those microorganisms and microbial toxins that cause disease in humans and include bacteria, bacterial toxins, viruses, fungi, rickettsiae, protozoans, and parasites. These disease-causing microorganisms may also be referred to as infectious agents. Arthropods and other organisms that transmit pathogens to animals (including humans) are called vectors. Etiologic agents, vectors, and materials containing etiologic agents are recognized as hazardous materials. Radioactive agents are materials that emit beta or gamma radiation.

Hazardous materials incidents can occur naturally and during the manufacture, transportation, storage and use of hazardous materials. These incidents can occur as a result of human error, natural hazards, deliberate deed, or a breakdown in equipment or monitoring systems. The impact depends upon the quantity and physical properties of the hazardous material, environmental and weather factors at the point of release, the type of release, and its proximity to human and wildlife populations and valuable ecosystems.

In 1986 Congress enacted the Emergency Planning and Community Right to Know Act (EPCRA) as part of the Superfund Amendments and Reauthorization Act (SARA) as a result of public concern regarding the environmental and safety hazards posed by the storage and handling of toxic chemicals. This act, known as SARA Title III, established requirements for federal, state, tribal, and local governments as well as industry regarding emergency response planning and the public's right to know about hazardous chemicals stored and released in their community. These provisions helped increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment.

In 1987, Washington adopted the Federal SARA Title III regulations in Chapter 118-40 of the Washington Administrative Code and established the Washington State Emergency Response Commission (SERC) to oversee implementation of requirements imposed by SARA Title III, including the creation of planning districts, designation of the Local Emergency Planning Committees (LEPC), and the development of a statewide master plan for hazardous materials incident response. The Washington SERC is comprised of a broad-based membership including representatives from private industry, state, tribal, and local governments. In addition, the Washington State Patrol, the Washington State Military Department - Emergency Management Division, and the Department of Ecology have specific responsibilities under the state regulation. The LEPC's representation consists of local elected officials, law enforcement, emergency management, fire fighting, health professionals, hospital, transportation, environmental,

Final Hazard Profile – Hazardous Materials

media, community groups, and industry representatives for each planning district. LEPCs are required to develop a local emergency plan for their district and to collect EPCRA information submitted by industry.

According to the Department of Ecology and Washington Emergency Management Division, in 2012 Washington State has 41 LEPCs, one for each of Washington's 39 counties as well as for the Emergency Services Coordinating Agency, the Southwest Snohomish Emergency Services Coordinating Agency, and the Fort Lewis military installation/reservation.

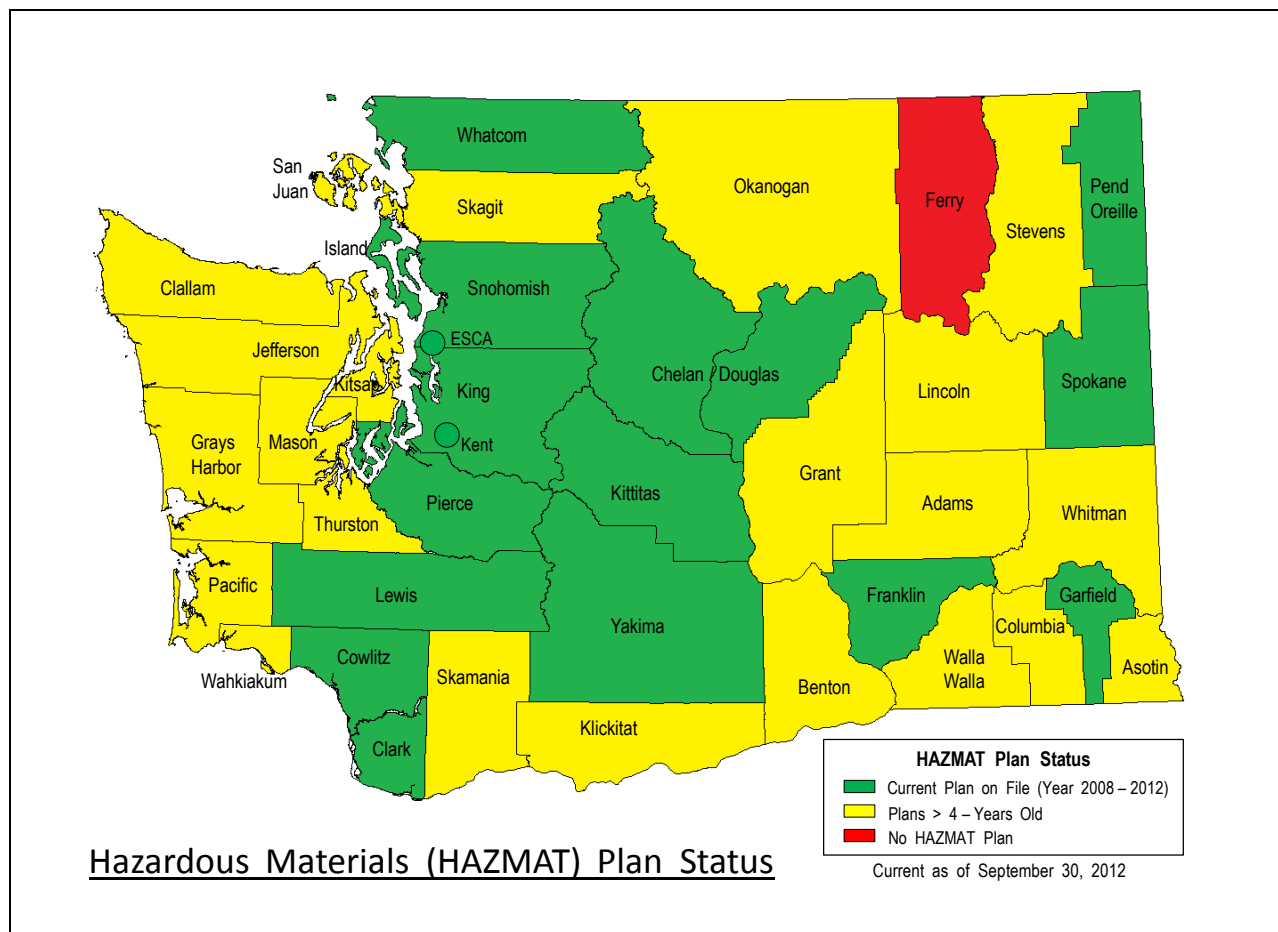


Figure 5.13-0-2 County HazMat Plan

The Washington SERC requires that all facilities or businesses that have reportable quantities of certain chemicals must complete a Tier Two – Emergency and Hazardous Chemical Inventory report annually for each hazardous or extremely substance present in excess of its threshold at any one time. The Washington Department of Ecology receives all EPCRA reports and manages EPCRA data on behalf of the Washington SERC. Most EPCRA reports must also be submitted to the LEPC, the local fire department or, when appropriate, to tribal nations or tribal emergency response commissions, their designated LEPC's, and fire departments.

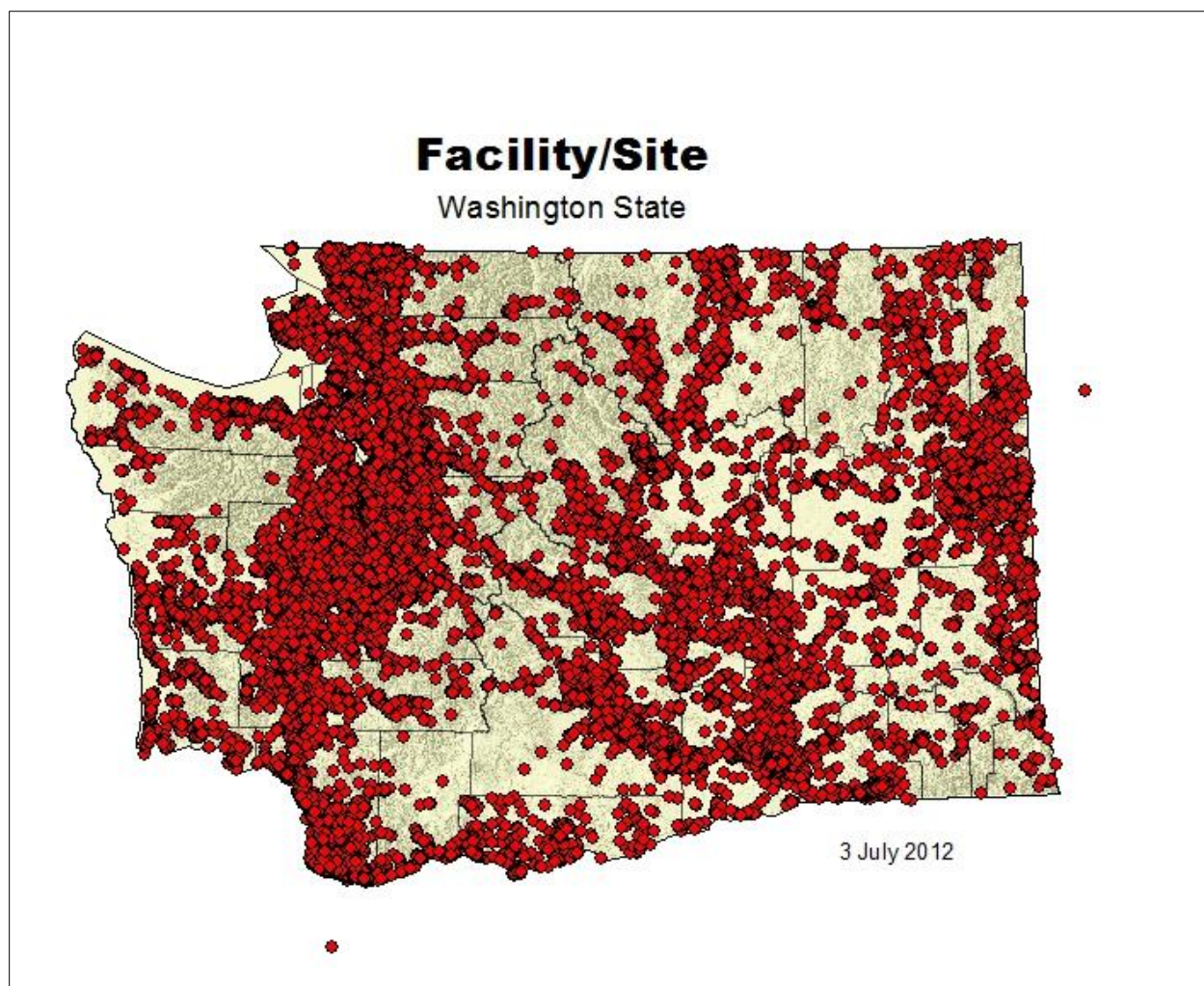


Figure 5.13-0-3 Locations of Facilities and Sites with Hazardous Chemicals

In an effort to help citizens, government, and industry better prepare for emergency response to chemical releases, the Washington State Emergency Response Commission (SERC) assembles and disseminates Tier Two data for facilities covered under the federal Community Right-to-Know laws. Reporting thresholds are: 10,000 pounds of a *hazardous substance* at any one time, and 500 pounds or less of an *extremely hazardous substance*. The graphic below indicate the total number of Tier Two reporting facilities and reportable substances by county for 2012 for hazardous substances.

Specific Washington Laws Relating to Hazardous Materials include: [RCW 90.56](#) – *Oil and Hazardous Substance Spill Prevention and Response*; [RCW 88.46](#) – *Vessel Oil Spill Prevention and Response*; [RCW 90.48](#) – *Water Pollution Control*; [RCW 88.40](#) – *Transport of Petroleum Products – Financial Responsibility*; [RCW 70.105](#) – *Hazardous Waste Management*; and [RCW 70.105D](#) – *Hazardous Waste Cleanup – Model Toxics Control Act*.

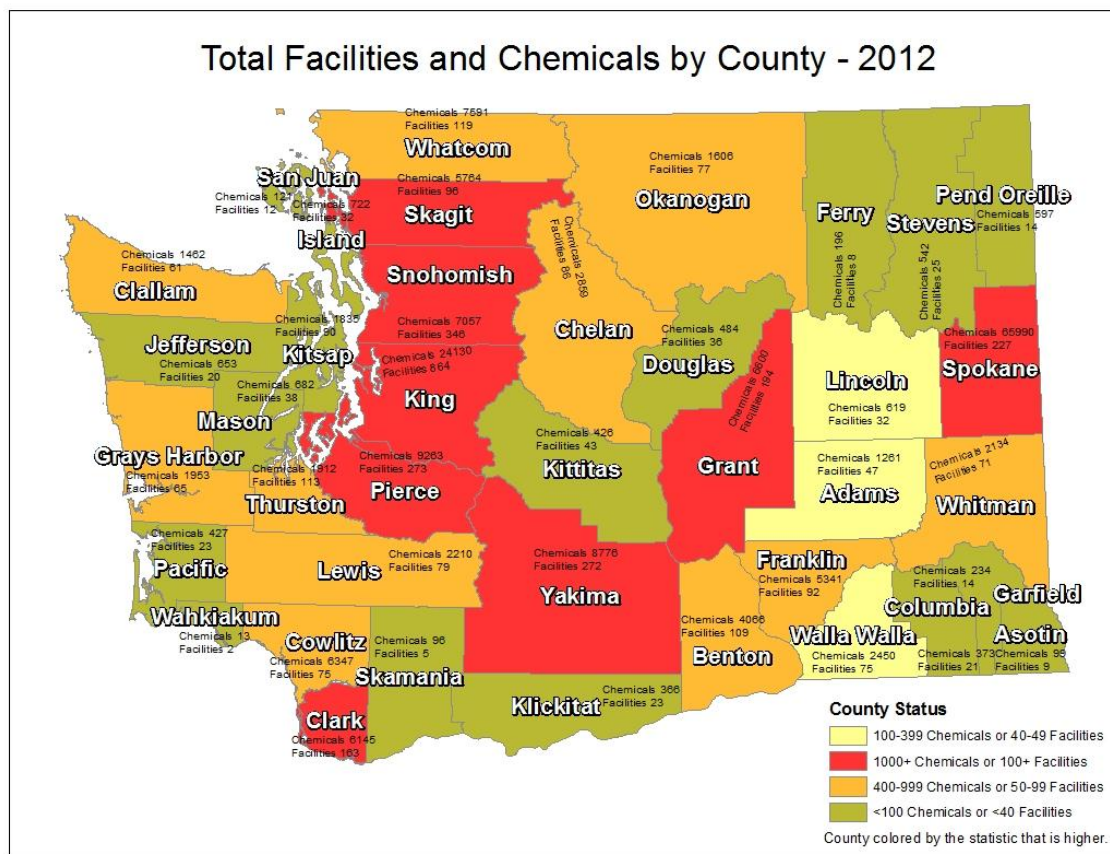


Figure 5.13-0-4 County HazMat Facilities and Chemicals

On January 16, 2013, U.S. Environmental Protection Agency (EPA) released its 2011 Toxics Release Inventory Report. The TRI National Analysis is an annual report that provides EPA's analysis and interpretation of the most recent TRI data. It includes information about toxic chemical releases to the environment from facilities that report to the TRI Program. It also includes information about how toxic chemicals are managed through recycling, treatment, and energy recovery, and how facilities are working to reduce the amount of toxic chemicals generated and released. The 2011 report includes geo-specific analyses for urban communities (Seattle-Bellevue-Tacoma metropolitan area), large aquatic ecosystems (Puget Sound Georgia Basin and Columbia River Basin), Indian Country and Alaska Native Villages (Tulalip Tribes), and state fact sheets. See <http://www.epa.gov/tri/tridata/tri11/nationalanalysis/>.

An excerpt from the Urban Communities Analysis: The Seattle-Tacoma-Bellevue, WA metropolitan statistical area in the Puget Sound region of Washington is composed of King, Snohomish, and Pierce counties. With a population of 3.5 million, it is the 15th largest U.S. metropolitan statistical area. Other cities in the Seattle metropolitan area include Tacoma, Bellevue, Everett, Kent, Renton, and Auburn.

Economic activity within the metropolitan area includes the manufacturing of aircraft, ships, biomedical products, forest products, seafood products, aluminum, steel, textiles, clothing, electronics, and metal

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and glass products. In addition, the Port of Seattle is a major port city for trans-Pacific and European trade and is the fifth largest container port in the United States.

Air releases accounted for 83% of total on-site disposal or other releases in the Seattle metropolitan area during 2011. The paper products sector reported 55% of the total air releases, mainly composed of hydrochloric acid and methanol. This sector also accounted for more than 99% of chemicals discharged to surface water, mainly nitrate compounds and methanol. One pulp and paper mill accounted for 44% of all air releases and 59% of all surface water discharges reported by facilities in the Seattle metropolitan area.

To help emergency responders become aware of the possible chemicals they may encounter at the locations of an incident, the U.S. Department of Transportation has established a hazardous materials placard system. Railroad cars and trucks carrying chemicals or hazardous wastes must display a diamond-shaped placard which includes a material identification number, a hazard class number and symbol, which identifies the material as a flammable liquid or solid, non-flammable or flammable gas, explosive, corrosive, toxic, oxidizer or organic peroxide, environmentally hazardous, or radioactive material.

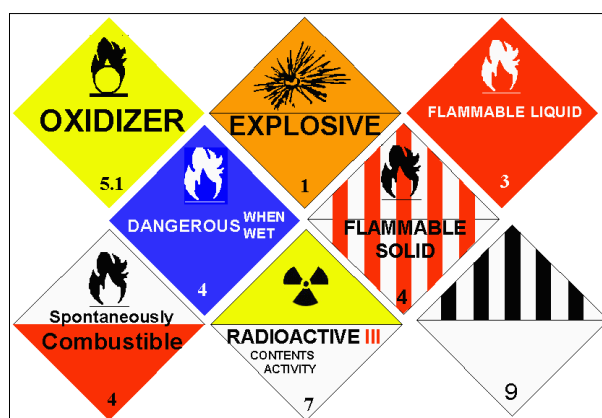


Figure 5.13 - 5 U.S. Department of Transportation

The Washington State Emergency Management Alert and Warning Center monitors various state and national alert systems besides tracking emergency incidents like hazardous materials (hazmat) spills. Hazmat incidents accounts for over half of the 2011 statistics below.

2011 Reported Incidents by County							
Table 1: State AWC Duty Officer/Reports/2011/Year End Statistical Report Spreadsheet							
COUNTY	FIRE	HAZMATS	OTHER	PHONE	SAR	WEATHER	TOTAL
Adams		7	1	1	1		10
Asotin		2			2		4
Benton		32	29	1	22		84
Chelan	28	13	1		49		91
Clallam	2	49	9	1	8		69

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Clark	6	199	35		14		254
Cowlitz	9	75	12		55		151
Columbia		4		2	4		10
Douglas	4	8	1				13
Ferry	12	2			8		22
Franklin		15	1		5		21
Garfield	1	8			2		11
Grant	3	24	4		8		39
Grays Harbor	10	45	2	6	7		70
Island	1	35	1		4		41
Jefferson	4	28	2	1	3		38
King	1	670	73		121		865
Kitsap	1	103	19		14		137
Kittitas	46	13		1	17		77
Klickitat	16	21	2		16		55
Lewis	2	13	4	3	5		27
Lincoln	3	4					7
Mason	9	19	3		13		44
Okanogan	40	5	6	1	21		73
Pacific	3	64	2	1	16		95
Pend Oreille	11	2	1		6		20
Pierce	1	249	77	1	37		365
San Juan	2	25	4	2	3		36
Skagit	10	88	159	18	30		305
Skamania	10	14	3	1	40		68
Snohomish	9	164	34	1	95		303
Spokane	9	47	8	1			65
Stevens	46	7	2		5		60
Thurston	2	75	17		11		105
Wahkiakum	2	9					11
Walla Walla	1	15	3		2		21
Whatcom	8	250	230		39		527
Whitman	1	4			3		8
Yakima	12	42	3	1	35		93
Total	325	2450	755	44	736	42	4372

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Spills ^{6, 7, 8, 9, 10, 11, 12, 13},

In Washington State over 20 billion gallons of oil and hazardous chemicals are transported by ship, barge, pipeline, rail and road each year. Equipment failure and human error in these situations can lead to oil and chemical spills that threaten public health and wildlife, contaminate the environment, and ultimately damage the state's economy and quality of life.

The Department of Ecology's Spill Prevention, Preparedness and Response Program works to protect Washington's environment, public health and safety through a variety of methods aimed first at preventing, but also by responding to spills when they do occur. Spill prevention actions include establishing a stricter oil transfer program for commercial maritime operations, increasing refinery, pipeline and vessel inspections, and stationing a government-funded rescue tug at Neah Bay to aid disabled vessels through emergency towing and salvage services. Ecology's spill response capability is maintained 24-hours-a-day and 7-days-a-week throughout the State. Ecology continues to receive over 4,000 spill reports annually.

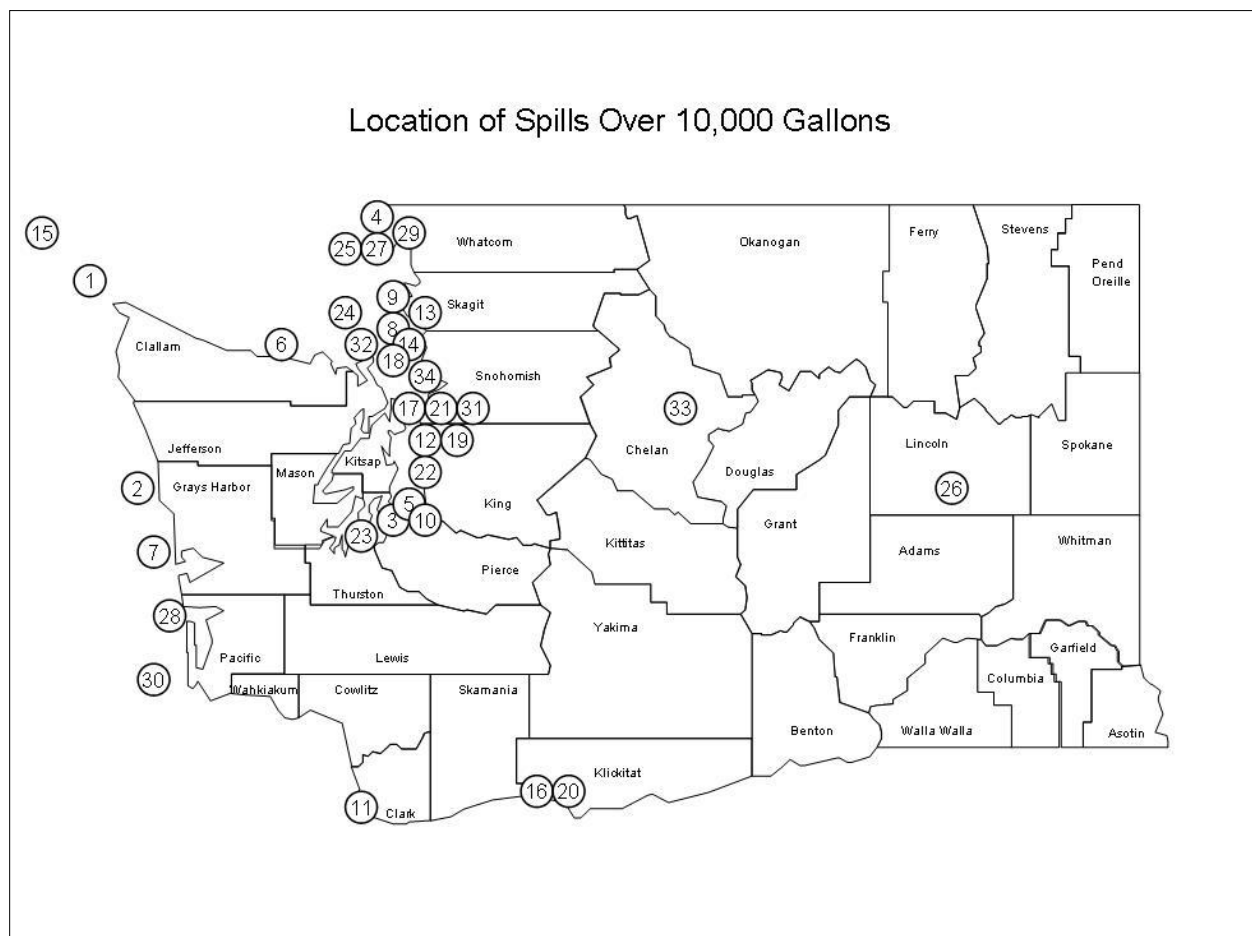


Figure 5.13-6: Oil Spills in Washington State A Historical Analysis.

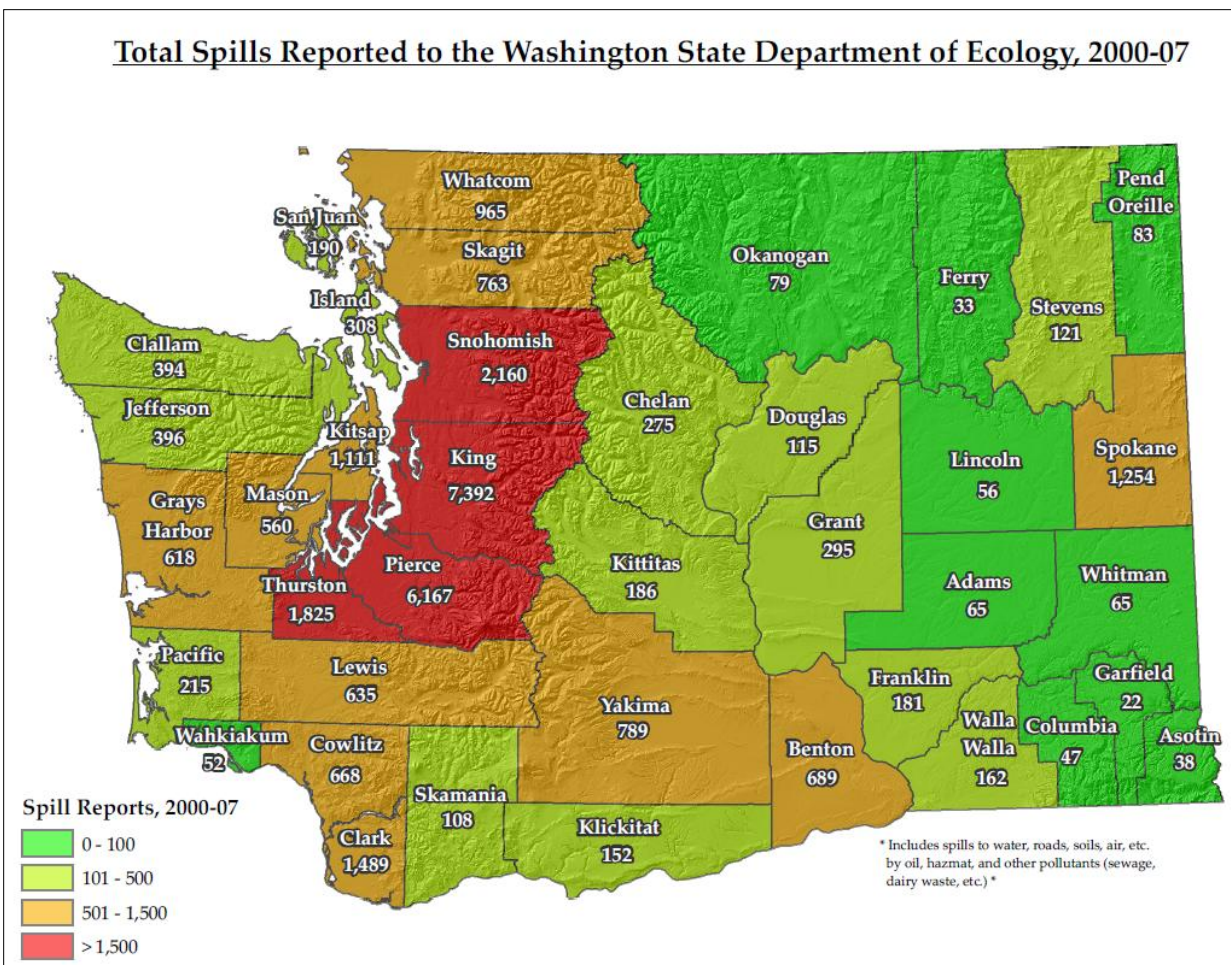


Figure 5.13-1 Total Spills Reported by County

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Clandestine Methamphetamine Labs and Dump Site Cleanup Activity^{14, 15, 16}

Illegal drug labs encountered by state and local agencies increased dramatically from 38 in 1990 to 1,890 in 2001 at its peak, to 92 in 2010. Ecology is responsible for handling and disposing of hazardous substances found at illegal drug lab sites. Nearly all of Washington's clandestine drug labs manufacture methamphetamine – also called *meth*, *crystal*, *crank*, or *speed*. Law enforcement intelligence indicates the recent decline may correspond with inexpensive drugs manufactured in Mexico and entering the United States.

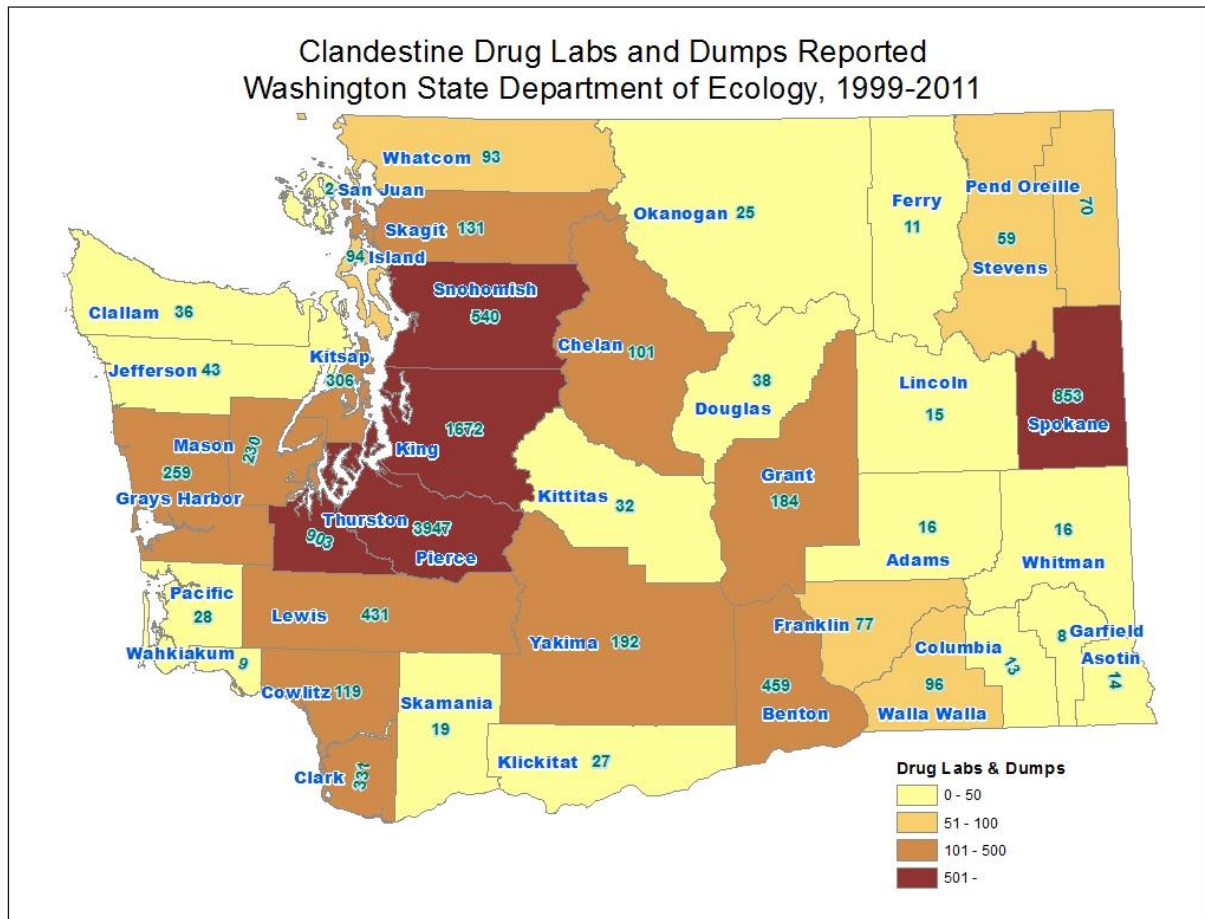


Figure 5.13-9 Clandestine Drug Lab and Dumps Reported by County

Radioactive Materials^{17, 18}

The Washington State Department of Health licenses nearly 400 facilities in the state that use radioactive materials. These are categorized in three major groups: medical, industrial, and laboratory. Hospitals, clinics, laboratories, and research facilities routinely use radiation in the diagnosis and treatment of medical and dental patients. Industrial applications include various flow gauges, research and development facilities, and radiography to non-destructive test welds and castings for flaws. Additionally, military bases that receive, ship, and store nuclear materials include Puget Sound Naval Shipyard at Bremerton, Naval Submarine Base Bangor, Joint Lewis-McChord Base and Fairchild Air Force

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Base. A specific Department of Health license is required to receive, possess, use, transfer, or acquire most radioactive materials. Licensees and registrants are periodically inspected for regulation compliance, material use and handling, personnel training, security, transportation, and other important factors that correspond with the possession of radiological materials.

There are five major types of ionizing radiation with various penetration abilities.

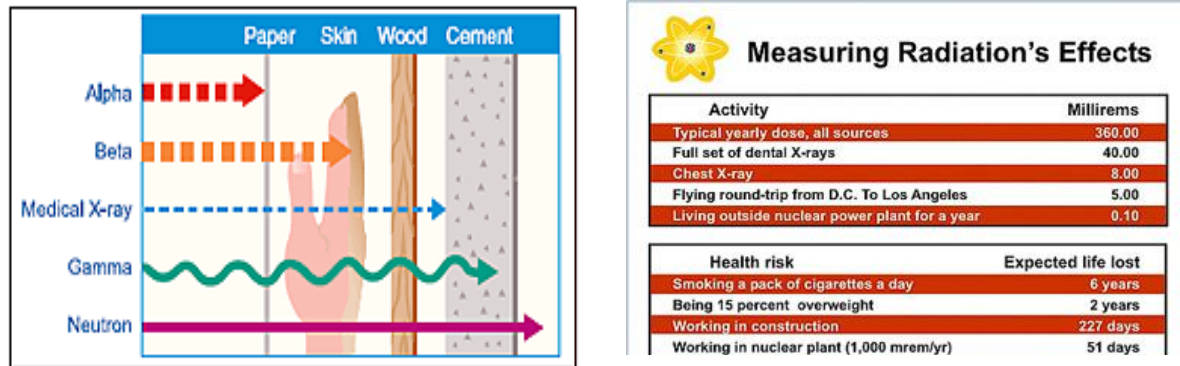


Figure 5.13 - 10 This figure shows the five types of ionizing radiation and their ability to penetrate a variety of materials.

The [*Integrated Fixed Facility Radiological and Chemical Protection Plan*](#) (IFFRCPP) maintained by the Washington State Emergency Management Division provides guidance to state agencies in the event of a chemical or radiological material incident. For radiological incidents, this plan covers incidents that may occur at the DOE-Hanford radiological waste storage facility, Energy Northwest's Columbia Generating Station nuclear power plant, and for the U.S. Navy bases that are located in and around the Puget Sound region. This plan includes emergency and notification procedures, emergency planning zones and protective action guidelines for both the CGS and Hanford-DOE areas.

Fukushima Tsunami and Nuclear Reactor^{19, 20}

On March 11, 2011, an earthquake in Japan was followed by a devastating tsunami that severely damaged three of the six nuclear reactors located at Fukushima. Shortly thereafter, the Washington State Department of Health added to its routine monitoring and began reporting daily readings of radiation around the state. On March 16, 2011 the Department of Health detected radioactive materials from Fukushima. Specific state health testing for radioactive materials from the damaged nuclear plants at Fukushima have consistently shown all levels have been well below any health concern for people living in Washington.

Monitoring for radioactive contamination in our environment continues throughout the state. The Environmental Protection Agency's (EPA) RadNet samplers are taking readings as they did before the earthquake. They returned to routine sampling schedule on May 3, 2011.

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Table 5.13 - 2: Background Radiation Results 2010 - 2012

Location	Most recent	Last 2011 number May 24, 2011	April 2011 Average	April 2011 Highest	April 2011 Lowest	2010 Average	2010 Highest	2010 Lowest
Richland	no data	no data	*	*	*	*	*	*
Seattle	14	9	14	41	7	*	*	*
Spokane	51	51	50	136**	13	92	841	13
Tumwater	25	17	21	61	7	25	155	5

Gross beta radiation in air sampling devices. <http://www.epa.gov/radnet/radiation-monitoring/index.html>

*Environmental Protection Agency (EPA) monitor out of service.

**The reading originally published for April 2011 was incorrect. The number has been corrected.

The National Oceanic and Atmospheric Administration (NOAA) and other federal agencies are tracking the debris washed into the ocean by the tsunami in Japan. Small amounts of tsunami debris began washing up on the West Coast of the United States and British Columbia in late spring 2012. The Washington State Department of Health has already field-tested hundreds of items from beaches in our state and found no radioactive contamination. State Scientists agree that finding radioactive debris is very unlikely for several reasons: 1) The tsunami created debris from a large stretch of Japan's coast, but the leak from the damaged Fukushima reactor occurred in one place. Most of the debris was many miles away from the reactor so it had no contact with the radioactive leak; 2) The leak of contaminated water from the reactor started days to weeks after the tsunami debris had washed out to sea. By the time the radioactive water leak developed, the debris was already in the ocean, miles away from the reactor; and 3) Ships, boats, and cargo coming into the United States from Japan were monitored for radiation, and readings were below the level of concern.

The Washington [State Marine Debris Response Plan](#) is designed to give local, tribal, state and federal responders flexibility in rapidly assessing a high-impact debris item and identifying which agencies will respond and what resources will be needed to protect public health, safety and the environment. The plan is designed to coordinate rapid responses to marine debris of significant impact – particularly items that are large, contain hazardous substances such as oil or toxic chemicals, or pose invasive species concerns.

The plan also is tailored to address the steady response to a potential influx of more routine, nonhazardous debris by supporting ongoing local community efforts – traditionally undertaken by dedicated volunteers – to remove these items. The plan calls for supporting these beach cleanup efforts such as providing volunteers litter bags and access to trash bins. If debris amounts overwhelm local efforts, crews from the Washington Department of Ecology's Washington Conservation Corps can be dispatched. The state marine debris response plan will continue to evolve over time and adapt to changing conditions.

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Hanford Nuclear Reservation^{21,22, 23}

The Hanford Nuclear Reservation was built by the US government in 1943 as the home for the Manhattan Project, the wartime effort to build the atomic bomb. The 560 square mile site bordering 51 miles of the Columbia River near the cities of Richland, Pasco and Kennewick, Washington, is the most contaminated site in North America, holding more than 60 percent of the nation's highly radioactive and chemically hazardous wastes. These 53 million gallons of high level radioactive hazardous wastes are stored in 177 underground tanks, 149 of which are leak-prone, single-shelled tanks posing a serious threat to the land, the nearby Columbia River, human health and the region's economy. Already, 67 of the single-shelled tanks have leaked about one million gallons of highly toxic contaminants into the ground and are moving through groundwater toward the Columbia River. In 2008, it was estimated that if cleanup does not proceed on schedule, the contamination will reach the Columbia River in 12 to 50 years depending on the specific location and type of contamination.

Approximately one million people live in the 42 cities and towns downstream from the Hanford site. About 8,000 farms worth an estimated \$6.4 billion are located in and around these communities. The region contributes to 10 percent of Washington's overall economy and 30 percent of Oregon's economy.

The most recent significant release of radioactive hazardous waste at the Hanford Nuclear Reservation tank farm was on July 27, 2007. Contractor CH2M Hill Hanford Group was pumping waste from a single-shell tank and tried to unblock the pump by running it in reverse. "Over 80 gallons of highly radioactive tank waste spilled," according to the manager of Ecology's Nuclear Waste Program. Upon investigating the circumstances around the spill, Ecology determined a series of administrative and engineering failures contributed to the accident including inadequacies in the design of the waste retrieval system.

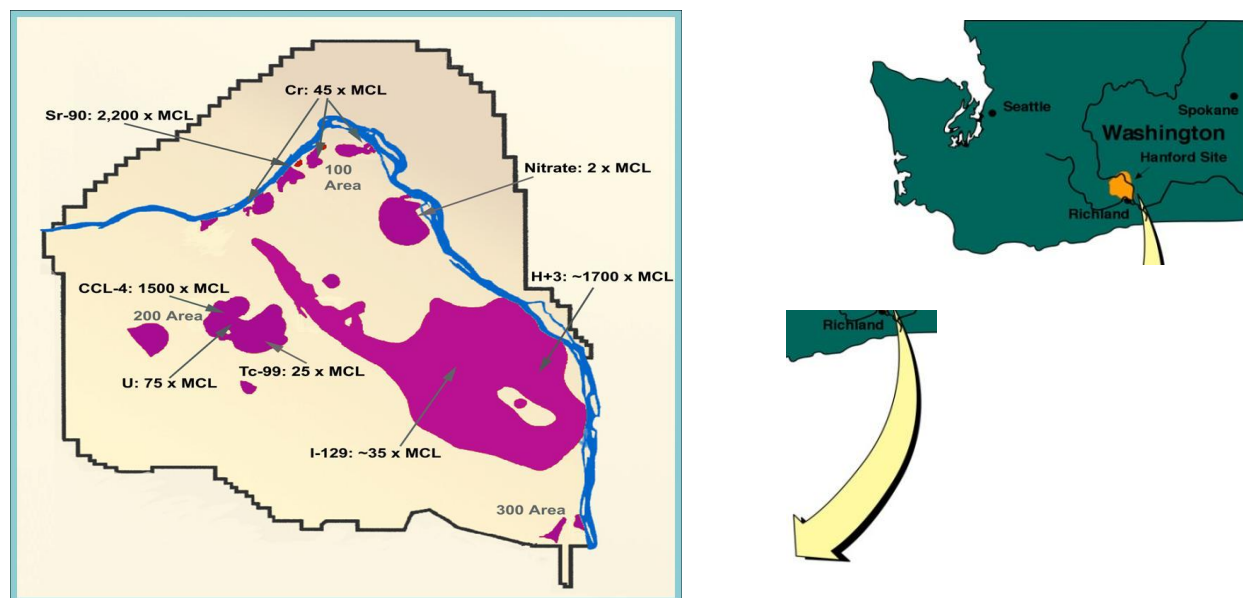


Figure 5.13 – 11: Combined Chemical and Radiological Groundwater Contamination (purple areas) Above Drinking Water Standard: Approximately 80 square miles

Final Hazard Profile – Hazardous Materials

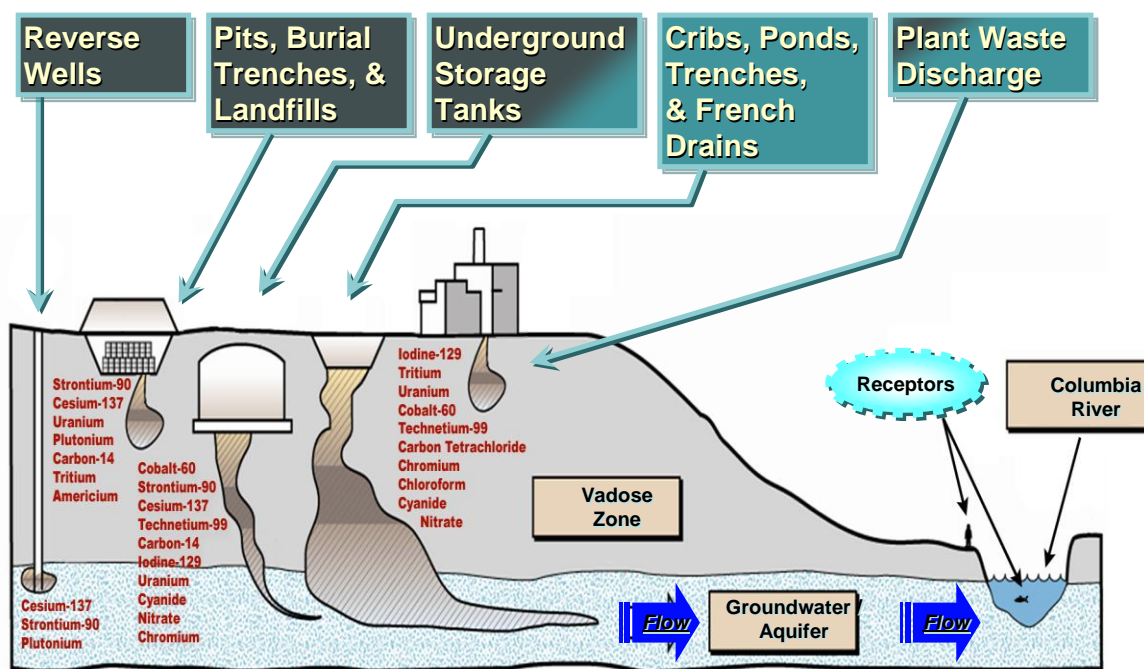


Figure 5.13 – 12: Hanford Sources of Contamination

Columbia Generating Station ²⁴

The Columbia Generating Station (CGS) is located on the Hanford Reservation 6 miles north of Richland and 2 miles west of the Columbia River. Energy Northwest's CGS is Washington's only operating commercial nuclear power plant. CGS is a boiling water reactor and produces 1,150 megawatts of electricity – enough to meet the needs of a city the size of Seattle. This electricity is sold at cost to Bonneville Power Administration (BPA).

CGS is a reliable energy producer. Unlike hydro, wind, and solar generation facilities, CGS is not dependent on weather conditions — it will produce electricity 24 hours a day, 7 days a week. In addition, operators are able to adjust power levels to meet Bonneville Power Administration's needs based on river and wind conditions referred to as "load following." Refueling and maintenance outages occur every two years during the spring, when the Columbia River Basin has ample runoff to generate electricity through hydroelectric turbines.

Five commercial reactors were initially planned for the State by the Washington Public Power System, but Units 4 and 5 were cancelled in 1982. Units 1 and 3 were cancelled in 1995. Construction of Unit 2 began in 1972, but more than a decade passed before it began generating power. Since the retirement of Oregon's Trojan Nuclear Plant, it is the only fully licensed commercial reactor in the northwestern United States. In 2000, Washington Public Power System changed its name to Energy Northwest and the plant's name to the Columbia Generating Station. It has a license to operate through 12/20/2023.

There have been several worldwide nuclear release accidents but there have been no incidents of radiological release at the Columbia Generating Station. A list of some of the minor incidents that have

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occurred at CGS is below.

Date	Table 5.13 - 3: Incident Description	Notification Level
14 May 1997	Explosion at the Plutonium Reclamation Facility (200 West Area)	Alert
28 January 1998	Picric Acid crystals found in 327 building (300 Area)	Alert
28 June 2000	24 COMMAND Range Fire (started in Benton County and came on-site. Threatened multiple facilities throughout the Hanford Site)	Alert
24 August 2005	Solid Waste Storage and Disposal Facility incident(200 West Area)	Alert
25 June 2004	Radiography vehicle stolen, vehicle later recovered	Alert
30 July 2004	Failure of two control rods to properly insert into the reactor	Alert
6 November 2005	Fast Flux Test Facility (FFTF) incident (400 Area)	Alert
28 March 2006	Range brush fire threatened the protected area near CGS	Alert

Table 6 Minor incidents that have occurred at CGS in recent history

The primary concern at the Columbia Generating Station is a potential release of radiological material. To ensure the likelihood is minimized, there are emergency plans in place and annual exercises conducted. In addition safety inspections are performed at the plant to ensure proper operation and safety procedures are followed.

Benton County Emergency Services, in coordination with Franklin County Emergency Management, the State of Washington, and Energy Northwest have developed plans to respond in the event of an accident at CGS. These plans are designed to help protect area residents, specifically those living within the Emergency Planning Zones (EPZ) around the nuclear power plant.²⁵ These plans are reviewed and updated routinely.

Two EPZs have been established as a basis for preparing to protect the public. Emergency plans for residents living up to ten miles from a nuclear facility, the plume EPZ, include ways to protect them from direct exposure to radiation in the event of a release of radioactive material.

Persons located up to fifty miles from a nuclear facility reside in the ingestion EPZ (Figure 2-5). Emergency plans for those in the ingestion EPZ include ways to protect them from consuming contaminated food. Examples of food or drink that can become contaminated with radiation are milk, fresh fruits, vegetables, processed products, and open water sources.²⁶

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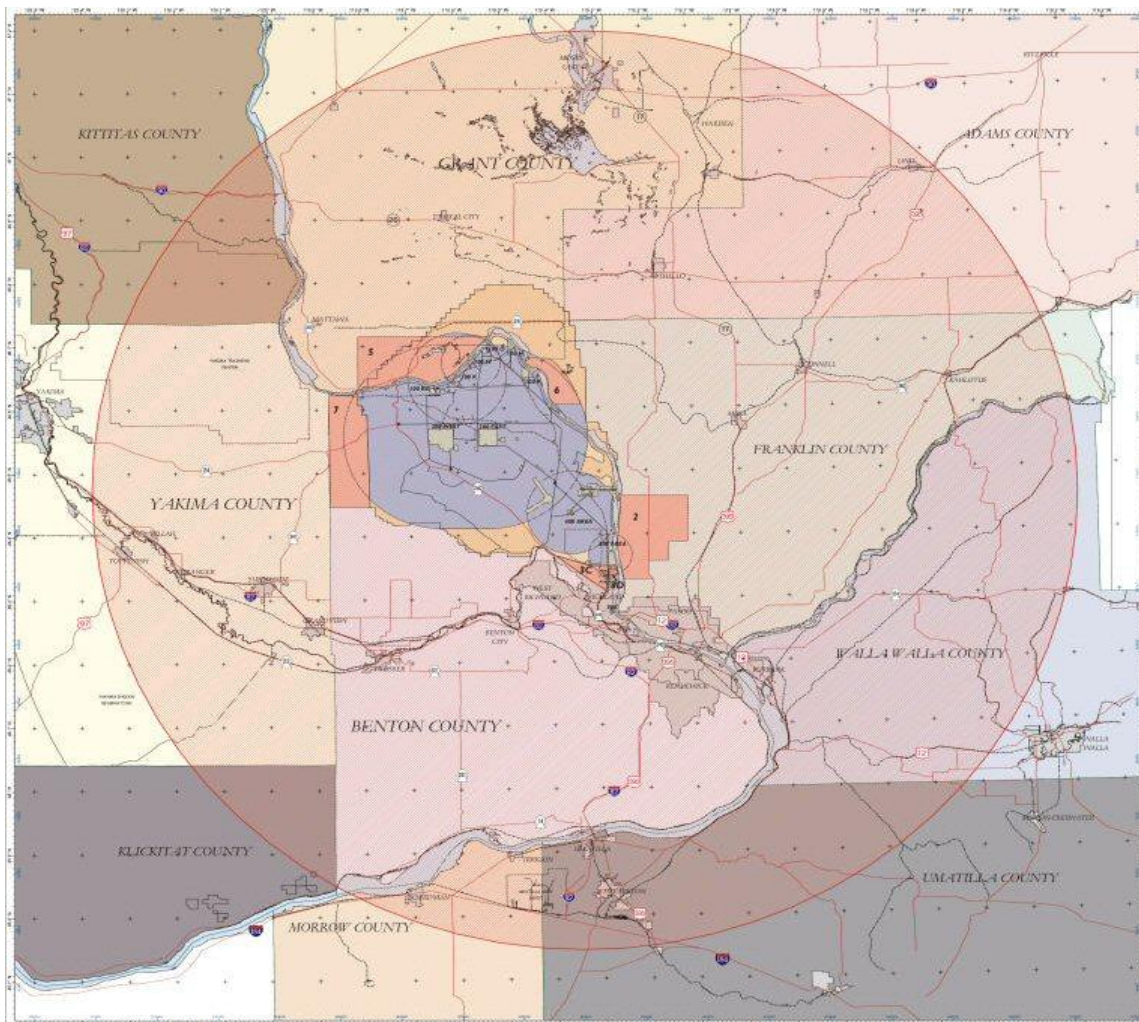


Figure 5.13 – 13: 50-Miles Ingestion Emergency Planning Zone

*Washington Cleanup Sites*²⁷

The Commencement Bay Nearshore-Tideflats Superfund site is located in the City of Tacoma and the Town of Ruston at the southern end of Puget Sound in Washington. It encompasses an active commercial seaport and includes 12 square miles of shallow water, shoreline, and adjacent land, most of which is highly developed and industrialized. The United States Environmental Protection Agency (EPA) placed the site on the Superfund National Priorities List in 1983 due to widespread contamination of the water, sediments, and upland areas.

The U.S. Department of Energy Hanford Site, located near the City of Richland, Washington, was established to produce nuclear materials for national defense. The Hanford Site was placed on EPA's Superfund National Priorities List of contaminated sites in 1989.

The Lower Duwamish Waterway Superfund Site is a 5.5 mile stretch of the Duwamish River that flows into Elliott Bay in Seattle, Washington. The waterway is flanked by industrial corridors, as well as the

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South Park and Georgetown neighborhoods. The site was added to EPA's Superfund National Priorities List in 2001.

Table 5.13 - 4: Washington State Cleanup Sites

City ▲	Title ▲	Type of Site ▲
Vancouver	Alcoa Smelter	Deleted NPL
Twisp	Alder Gold and Copper Mill	Removal
Benton County	Alexander Farms, Benton County, WA	Removal
Chehalis	American Crossarm & Conduit Co.	NPL
Leadpoint	Anderson-Calhoun Mine and Mill	Removal
Tacoma	Asarco Smelter - Ruston	Part of NPL site
Silverdale	Bangor Naval Submarine Base	NPL
Silverdale	Bangor Ordnance Disposal (USNAVY)	NPL
Seattle	Basin Oil	Removal Assessment
Seattle	Boeing Electronics Manufacturing Facility (EMF) Superfund Site	Removal
Marysville	Boeing Tulalip Test Site	NPL Equivalent
Colville	Bonanza Mill	Site Assessment
Vancouver	Boomsnub-AIRCO	NPL
Vancouver	Boomsnub 2001 Removal	Removal
Bellevue	BP Tank Truck Accident - Bellevue	Oil
Bremerton	Bremerton Gasworks Site	Oil
	Brownfields and Washington State	Brownfields
Vancouver	Camp Bonneville Site	BRAC
Centralia	Centralia Municipal Landfill	NPL
Tacoma	CleanCare Removal Site	Removal
Chehalis	Coal Creek - Ross Electric	NPL Equivalent
Colbert	Colbert Landfill	NPL
Colville	Colville Post and Poles, Inc.	Removal
Tacoma	Commencement Bay-Nearshore Tideflats	NPL
Tacoma	Commencement Bay-South Tacoma Channel	NPL
Vancouver	Dorothy Avenue Mercury Site	Response
Reardan	Euclid Road Groundwater Site	Removal
Spokane	Fairchild Air Force Base (4 Waste Areas)	NPL
Yakima	FMC Corp. Yakima Superfund Site	NPL
Fort Lewis	Fort Lewis Logistics Center	NPL
Fort Lewis	Fort Lewis (Landfill No. 5)	Deleted NPL
Vancouver	Frontier Hard Chrome, Inc.	NPL

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Spokane	General Electric Co. (Spokane Shop)	NPL
	Grandview Pesticide Fire	Removal
Spokane	Greenacres Landfill	NPL
Chehalis	Hamilton-Labree Roads Groundwater Contamination	NPL
North Bonneville	Hamilton Island Landfill (USA/COE)	Deleted NPL
Richland	Hanford - Washington	NPL
Richland	Hanford 100-Area (USDOE)	NPL
Richland	Hanford 1100-Area (USDOE)	Deleted NPL
Richland	Hanford 200-Area (USDOE)	NPL
Richland	Hanford 300-Area (USDOE)	NPL
Seattle	Harbor Island (Lead)	NPL
Puyallup	Hidden Valley Landfill (Thun Field)	NPL
Chelan	Holden Mine	Mining
Bothell	Horse Creek Mystery Spill	Removal
Tacoma	Hylebos Waterway	Part of NPL site
Issaquah	Issaquah Mini-Storage Response	Response
Bremerton	Jackson Park Housing Complex (USNAVY)	NPL
Kent	Japanese Auto Wrecking	Removal
Seattle, Washington	Jorgensen Forge Early Action Area	Part of NPL site
Skyway	Junior's Trucking Tire Fire	Response
Nighthawk	Kaaba-Texas Mine Removal, Nighthawk, WA	Removal
Mead	Kaiser Aluminum Mead Works	NPL
Enumclaw	Koopman Dairy	Removal
Lake Tapps	Lake Tapps Abandoned Drums	Response
Seattle	Lake Washington Dry Docks	Response
Lakewood	Lakewood Site	NPL
Northport	Le Roi Smelter	Removal
Seattle	Lockheed West Seattle	NPL
Seattle	Lower Duwamish Waterway Superfund Site	NPL
Seattle	Malarkey Asphalt Company	Removal
Mica	Mica Landfill	NPL
Tacoma WA	Middle Waterway	Part of NPL site
Wellpinit	Midnite Mine Superfund Site	NPL
Kent	Midway Landfill	NPL
Moses Lake	Moses Lake Wellfield Contamination Superfund Site	NPL
Keyport	Naval Undersea Warfare Center (4 Areas)	NPL
Spokane	North Market Street	NPL

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Spokane	Northside Landfill	NPL
Everson	Northwest Transformer (Mission Pole)	Deleted NPL
Everson	Northwest Transformer (South Harkness Street)	Deleted NPL
Bellingham	Oeser Company	NPL
Spokane	Old Inland Pit	NPL
Manchester	Old Navy Dump/Manchester Lab (USEPA/NOAA)	NPL
Renton	Olympic Pipeline Sample Line Gasoline Spill	Oil
Tacoma	Olympic View Removal Action and Monitoring	Part of NPL site
Renton	Pacific Car and Foundry (PACCAR)	NPL
Seattle	Pacific Sound Resources	NPL
Tumwater	Palermo Well Field Groundwater Contamination	NPL
Pasco	Pasco Sanitary Landfill	NPL
Yakima	Pesticide Lab (Yakima)	Deleted NPL
Fidalgo Island	PM Northwest Removal Site	Removal
Bremerton	Puget Sound Naval Shipyard Complex	NPL
Maple Valley	Queen City Farms	NPL
Renton	Quendall Terminals	Site Assessment
	RCRA Corrective Action Sites in Washington	RCRA CA
Seattle	Rhone-Poulenc Incorporated	RCRA CA
SeaTac	SeaTac Oilspill	Oil
Kent	Seattle Municipal Landfill (Kent Highlands)	NPL
Loomis	Silver Mountain Mine	Deleted NPL
Spokane	Spokane Junkyard and Associated Properties	Deleted NPL
Whatcom County	Sumas Mountain Asbestos Documents	Site Assessment
Whatcom County	Swift Creek Asbestos Site	Site Assessment
Tacoma	Tacoma Tarpits	Part of NPL site
Tacoma	Thea Foss Abandoned Drums	Removal
Tacoma	Thea Foss, Wheeler-Osgood Waterway	Part of NPL site
Brush Prairie	Toftdahl Drums	Deleted NPL
Marysville	Tulalip Landfill	Deleted NPL
	Upper Columbia River Site Study	Remedial
Tacoma	US Oil Jet Fuel Spill	Oil
Tacoma	USAF McChord AFB American Lake Gardens	NPL
Tacoma	USAF McChord Air Force Base (Wash Rack Treatment Area)	Deleted NPL
Vancouver	USDOE BPA Ross Complex	Deleted NPL
Oak Harbor	USNAVY Naval Air Station, Whidbey Island (Ault)	NPL
Oak Harbor	USNAVY Naval Air Station, Whidbey Island (Seaplane)	Deleted NPL
Port Hadlock	USNAVY Port Hadlock Detachment Naval Ordnance Ctr Pac	NPL

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	<u>Div</u>	
Vancouver	Vancouver Water Station #1 Contamination	NPL
Vancouver	Vancouver Water Station #4 Contamination	NPL
Spokane	Vermiculite Northwest - Spokane WA	Site Assessment
Seattle	West Waterway Tributyltin (TBT)	Part of NPL site
Kent	Western Processing Company, Inc.	NPL
Longview	Weyerhaeuser Oil Tank	Oil
Bainbridge Island	Wyckoff Eagle Harbor	NPL
Yakima	Yakima Plating Company	Deleted NPL
Yakima	Yakima Reservation Pesticide Dump	Response
Yakima	Yakima Residential Mercury Release	Response

Figure 12 source:

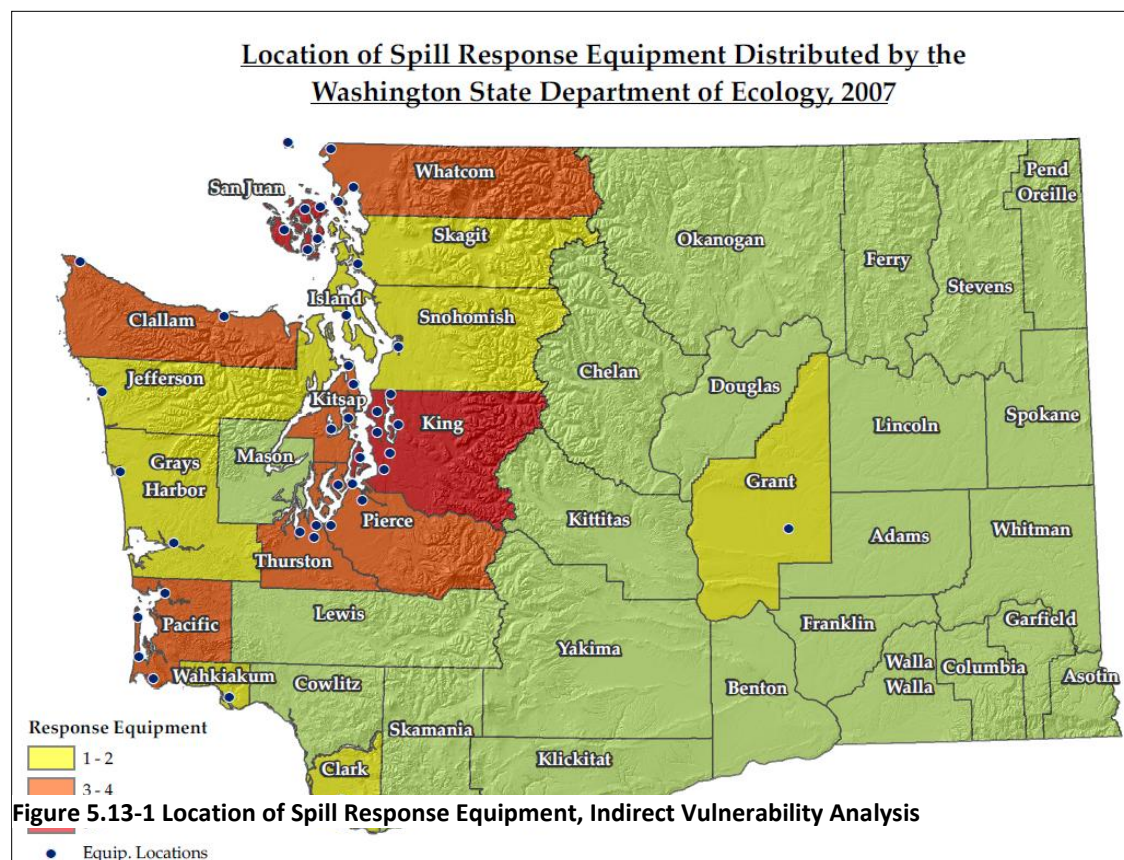
<http://yosemite.epa.gov/r10/cleanup.nsf/webpage/Washington+Cleanup+Sites!OpenDocument&Count=250&ResortAscending=1>

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Jurisdictions Most Threatened and Vulnerable to Hazardous Materials Hazards

Although Washington has a varied history of hazardous materials incidents including the unwanted, unplanned, or deliberate release or escape of explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, or radioactive substances that may cause or create a potential risk to public health, safety, or the environment, it is nevertheless very hard to predict. Determining future hazardous materials incidents is difficult because so many factors can contribute and there are so many different types of incidents. Nonetheless, hazardous materials incidents have impacted every county in the state.

Western Washington counties are more at risk due to dense industrial and populated areas and major transportation routes surrounding the fragile ecosystems of the Puget Sound and coastal waterways. The Westside has two Superfund sites while the Eastside has the Superfund site of Hanford. Although an analysis has not been conducted to determine the jurisdiction of greatest risk nor was there an attempt to estimate potential losses to state facilities due to hazardous materials incidents, Ecology has distributed its response equipment accordingly.



Potential Climate Change Impacts^{28,29,30,31}

With the advent of climate change coming into worldwide focus; it is necessary to take into account the potential effects this emerging climate crisis may have on the dangers associated with tsunamis. The research done so far indicates the potential for unusual or more frequent heavy rainfall and flooding is greater in some areas while the potential for drought is predicted in other areas. Landslide frequency is correlated with heavy rainfall and flooding events. Sea level rise may impact inundation areas.

According to a 2005 Governor's report prepared by the Climate Impacts Group titled *Uncertain Future: Climate Change and its Effects on Puget Sound*, from "paleoclimatological evidence, we know that over the history of the earth high levels of greenhouse gas concentrations have correlated with, and to a large extent caused, significant warming to occur, with impacts generated on a global scale." While the report also indicates that the "ultimate impact of climate change on any individual species or ecosystem cannot be predicted with precision," there is no doubt that Washington's climate has demonstrated change.

In July 2007, the Climate Impacts Group launched an unprecedented assessment of climate change impacts on Washington State. *The Washington Climate Change Impacts Assessment* (WACCIA) involved developing updated climate change scenarios for Washington State and using these scenarios to assess the impacts of climate change on the following sectors: agriculture, coasts, energy, forests, human health, hydrology and water resources, salmon, and urban stormwater infrastructure. The assessment was funded by the Washington State Legislature through House Bill 1303.

In 2009, the Washington State Legislature approved the *State Agency Climate Leadership Act* Senate Bill 5560. The Act committed state agencies to lead by example in reducing their greenhouse gas (GHG) emissions to: 15 percent below 2005 levels by 2020; 36 percent below 2005 by 2035; and 57.5 percent below 2005 levels (or 70 percent below the expected state government emissions that year, whichever amount is greater.). The Act, codified in RCW 70.235.050-070, directed agencies to annually measure their greenhouse gas emissions, estimate future emissions, track actions taken to reduce emissions, and develop a strategy to meet the reduction targets. Starting in 2012 and every two years thereafter, each state agency is required to report to Washington State Department of Ecology the actions taken to meet the emission reduction targets under the strategy for the preceding biennium.

Recognizing Washington's vulnerability to climate impacts, the Legislature and Governor Chris Gregoire directed state agencies in 2009 to develop an integrated climate change response strategy to help state, tribal and local governments, public and private organizations, businesses and individuals prepare. The state Departments of Agriculture, Commerce, Ecology, Fish and Wildlife, Health, Natural Resources and Transportation worked with a broad range of interested parties to develop recommendations that form the basis for a report by the Department of Ecology: *Preparing for a Changing Climate: Washington State's Integrated Climate Change Response Strategy*.

Over the next 50 - 100 years, the potential exists for significant climate change impacts on Washington's coastal communities, forests, fisheries, agriculture, human health, and natural disasters. These impacts could potentially include increased annual temperatures, rising sea level, increased sea surface temperatures, more intense storms, and changes in precipitation patterns. Therefore, climate change has the potential to impact the occurrence and intensity of natural disasters, potentially leading to additional loss of life and significant economic losses. Recognizing the global, regional, and local

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implications of climate change, Washington State has shown great leadership in addressing mitigation through the reduction of greenhouse gases.

It can be argued that hazardous material spills and chemical or radiological releases, whether from facilities or during transportation, can be associated with weather patterns and natural disasters but the climate change impact would be of a secondary nature. It may exacerbate the problem but probably will not cause a release outright.

At Risk State Facilities

This profile will not attempt to estimate potential losses to state facilities due to hazardous materials incidents.

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